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(54) **Method for preparing a security document with a toner accepting layer**

Verfahren zur Herstellung fälschungssicherer Dokumente mit einer tonerempfangenden Schicht

Méthode de fabrication de documents de sécurité comprenant une couche réceptrice de révélateur

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(56) References cited:
EP-A- 0 424 343
DE-A- 2 454 047
DE-A- 2 952 322
DE-A- 19 510 974
US-A- 5 045 426

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Description

1. Field of the invention.

[0001] The present invention relates to a print, more particularly to a tamperproof identification document.

2. Background of the invention.

[0002] Identification documents essentially comprise a card or sheet material containing information retaining to the bearer. Generally a portion of the information is in the form of a photograph. Identification cards (I.D. cards) are used e.g. to establish a person's authorization to conduct certain activities (driver's licence) or the authorization to have access to certain areas(employee I.D. cards) or to engage in credit transactions (I.D. credit cards).

[0003] In view of the widespread use of I.D. cards, especially in commercial transactions such as cashing checks, credit purchases, etc., it is important that the information contained in the I.D. card cannot be altered and that the I.D. card gives maximum protection against counterfeiting by alteration and/or replacement of its data and photograph.

[0004] Many of these security documents are nowadays prepared by digitally recording by means of a black-and-white laser printer. However an increasing number of these security documents are recorded in full color with color laser printers. The obtained color image is fixed by means of moderately heated fixation rollers which are treated with a silicone oil in order to prevent that the color toner should adhere to said fixation rollers during the fixation. However during said fixation some of the silicone oil adheres to the toner accepting layer. This is the cause of different problems.

[0005] First of all, the adhesion of the color toner to the toner accepting layer is weak, so that by scratching the image can be removed. Furtheron said accepting layer after it is printed with toner can not be laminated anymore due to the fact that silicone oil is present. These problems also arise with black toners although not to such an extent.

[0006] DE-A-19510974 discloses a paper sheet to be printed with a laser printer, having falsification preventing properties.

[0007] The paper comprises a thermoplastic resin based coating layer.

[0008] EP-A-424 343 discloses a sheet useful in ion deposition printing, comprising a substrate and a coating layer which may comprise ethylene-acrylic acid copolymer.

[0009] DE-A-2 454 047 discloses an electrographic element comprising a dielectric top layer of ethylene-acrylic acid copolymer.

3. Summary of the invention.

[0010] It is an object of the present invention to provide a method for producing a security document which has a strong adhesion of a toner, especially of a color toner to the toner accepting layer.

[0011] It is a further object of the present invention to provide a method for producing a security document wherein the accepting layer after it is printed with toner can be laminated to a strong laminate.

[0012] According to the present invention there is provided a method for preparing a security document comprising the step of printing with a laser printer on an imaging element comprising a support and a toner accepting layer, characterized in that said toner accepting layer is a layer comprising a copolymer of ethylene and acrylic acid.

4. Detailed Description of the Invention.

[0013] A toner accepting layer in the present disclosure is every layer capable of accepting toner from laser color printing equipment. Said toner may be a black toner but is preferably a color toner. According to the invention said toner accepting layer is a layer comprising a copolymer of ethylene and acrylic acid. Preferably said layer is a layer comprising at least 80 % by weight of said copolymer, more preferably said layer consist of said copolymer.

[0014] A copolymer of ethylene and acrylic acid according to the invention comprises preferably between 10% and 50 % by weight of acrylic acid, more preferably between 13 % and 35 % by weight of acrylic acid, most preferably between 17 % and 25 % by weight of acrylic acid.

[0015] A copolymer of ethylene and acrylic acid according to the invention has preferably a melt index between 100 and 10000, more preferably a melt index between 300 and 3000. A copolymer of ethylene and acrylic acid according to the invention has preferably a weight average molecular weight between 10000 and 100000, more preferably between 15000 and 30000.

[0016] A copolymer of ethylene and acrylic acid according to the invention is preferably used at a pH between 3 and 10, more preferably at a pH between 6 and 9. In order to obtain said pH, a solution or dispersion of a copolymer according to the invention is completely or partially neutralized with an alkali base or buffer salt or more preferably with ammonia.

[0017] Copolymers of ethylene and acrylic acid are commercially available under the name of PRIMACOR from Dow Chemicals, Michigan, USA.

[0018] A toner accepting layer according to the invention is preferably present in a weight between 0.5 g/m^2 and 30 g/m^2, more preferably between 1.0 g/m^2 and 15 g/m^2, most preferably between 2.0 g/m^2 and 8.0 g/m^2.

[0019] The support in accordance with the invention is preferably a flexible support. Said flexible support can

be transparent or opaque.

[0020] The opaque support is e.g. an opaque paper support or resin coated paper support, e.g. polyolefin coated paper and polyethylene coated paper of which the polyethylene layer may contain opacity providing pigments such as white TiO_2 particles as described e. g. in EP-A 324 192. Preferably security paper is used.

[0021] Other opaque supports that may be used are resin supports containing in their resin mass dispersed white pigments, e.g. TiO_2, or are such resin supports that contain said pigments dispersed in the resin mass in the presence of light-straying microvoids as described e.g. in EP 349152. Organic resins used for manufacturing said supports, e.g. by extrusion, are polycarbonate, polyester, preferably poly(ethylene terephthalate) or poly(ethylene naphthalate), poly (methylacrylaat-styrene-acrylonitrile), poly (acrylonitrile-butadiene-styrene), polyamides, polyethersulfones, polyetherketones, polystyrene, poly-Alpha-olefins such as polypropylene or polyethylene, polyvinyl acetals and homo- and copolymers of vinyl chloride. Further are mentioned cellulose esters e.g. cellulose triacetate.

[0022] Transparent or translucent supports may be transparent or translucent organic resins e.g. the resins cited above. Preferred transparent or translucent supports are films of polyesters such as poly(ethylene terephthalate) or of poly-Alpha-olefins such as polyethylene.

[0023] The toner accepting layer may be present contiguous to the support. Preferably there are layers present between the toner accepting layer according to the invention and the support. Such layers can be subbing layers to improve the adhesion between the support and the toner accepting layer. Such layer can also be an information carrier, at least part of the information being present in the toner image receiving layer.

It is required when said imaging element is used as a security document to laminate said imaging element either by laminating a laminating foil against the support of the imaging element or by providing a laminating foil at one outer side of the imaging element and another laminating foil at the other outer side of the imaging element and laminating these laminating foils together. The use of a pouch structure wherein only the border parts of the plastic sheets are sealed is not preferred for security documents because they are not sufficiently tamperproof since after cutting around the edge the pouch can be opened and some information can be removed or transformed before resealing the pouch.

[0024] Therefore, to avoid said shortcoming a "security seal" is established between the toner accepting layer of the document and the laminating foil. As described in US-P 4,151,666 the security seal makes that if one should succeed in the removal of the plastic cover sheet also a substantial portion of the information containing part of the document should be removed too so that a damaged part remains adhering partly or totally to said plastic cover sheet.

[0025] In a security document according to the invention comprising a toner accepting layer comprising a copolymer of ethylene and acrylic acid an effective security seal is easily made between the toner accepting layer and a laminating foil when a laminating foil is laminated to the toner accepting layer.

[0026] One laminating foil can be a single layer of an organic resin e.g. a polyethylene, a polypropylene film or a polyester film.

[0027] A laminating foil has preferably a thickness of only 0.050 to 0.200 mm. A sheet of that thickness can still be manipulated easily in a mechanical printing process, e.g. offset or intaglio printing, and can receive security or verification marks in the form of e.g. a watermark, finger prints, printed patterns known from bank notes, coded information, e.g. binary code information, signature or other printed personal data or marks that may be applied with liquid crystals, fluorescent pigments, nacreous pigments giving special light-reflection effects, and/or visibly legible or ultraviolet-legible printing inks as described e.g. in GB-P 1,518,946 and US-P 4,105,333.

[0028] Further security features are infrared-absorbing markings, mildly radioactive isotope patterns, magnetic dots or strips and electronic microcircuits hidden from visibility.

[0029] At least one of the laminating foils and optionally both of the laminating elements comprises an outer resin layer and an inner resin layer. By "inner resin layer" of a laminating element comprising an inner and an outer resin layer is meant the resin layer which after lamination is nearest to the toner accepting layer. The "outer resin layer" is then the layer of said laminating element which after lamination becomes an outside layer of said security document.

[0030] Said outer resin layer can be any transparent or translucent organic resin e.g. cellulose acetate film, poly(vinyl acetal) film, polystyrene film, polycarbonate film or polyvinyl chloride film. Preferably said outer resin layer is a poly(ethylene terephthalate) film, more preferably an oriented poly(ethylene terephthalate) film.

[0031] Said inner resin layer can be any transparent or translucent melt-adhesive layer comprising an organic resin having a lower glass transition temperature (T_g) and melting temperature (T_m) than the outer resin layer. Preferably the glass transition temperature of the resin comprised in the inner resin layer is at least 20°C, more preferably at least 40°C lower than the glass transition temperature of the resin comprised in the outer resin layer. Most preferably said inner resin layer is a polyalkylene layer, particularly preferably a polyethylene layer. In this connection reference is made to the Tg values of polyethylene, polypropylene, polyvinyl chloride and polyethylene terephthalate being -20°C, +5°C, +80°C and +67°C respectively (see J.Chem. Educ., Vol. 61, No. 8. August 1984, p. 668).

[0032] In a preferred embodiment the toner accepting layer is coated on a laminating foil which after the gen-

eration of information on or in the toner accepting layer can be laminated to a support, preferably a flexible opaque support, most preferably paper such as security paper.

[0033] The optical information can be partly applied directly on the support of the information carrier by printing techniques. Suitable printing processes are e.g. planographic offset printing, gravure printing, intaglio printing, screen printing, flexographic printing, relief printing, tampon printing, ink jet printing, laser printing, thermal transfer printing, dye diffusion thermal transfer printing and toner-transfer printing from electro(photo) graphic recording materials.

[0034] On said support can be applied security or verification marks in the form of e.g. a watermark, finger prints, printed patterns known from bank notes, coded information, e.g. binary code information, signature or other printed personal data or marks or layers that may be applied with liquid crystals, fluorescent pigments, nacreous pigments giving special light-reflection effects, and/or visibly legible or ultraviolet-legible printing inks as described e.g. in GB-P 1,518,946 and US-P 4,105,333.

[0035] The image on said imaging element is at least partially generated in or on the toner accepting layer by exposure of the imaging element to a laser printer, preferably a color laser printer followed by a fixation, preferably a thermal fixation of the obtained image.

[0036] The following example illustrates the present invention withouthowever limiting it thereto.

[0037] All parts, ratios and percentages are by weight unless otherwise stated.

EXAMPLE

Preparation of imaging element I (comparison imaging element)

[0038] A 65 μm thick transparent polyethylene therephthalate film is coated with a layer comprising 0.5 g/m^2 of gelatine and a latex of polyester-polyurethane at 400 mg/m^2 of solid product. Thereon was coated a layer containing 0.7 g/m^2 of carboxymethylcellulose, 1.4 g/m^2 of gelatine, 3.10^{-3} mmole/m^2 of silver sulphide nuclei, 18.10^{-3} mmole/m^2 of nickel sulphide nuclei and 1.7g/m^2 of a nacreous pigment. On top of said layer is coated a layer containing 0.5 g/m^2 of gelatine.

Preparation of imaging element II (imaging element according to the invention)

[0039] A 65 μm thick transparent polyethylene therephthalate film is coated with a layer comprising 0.35 g/m^2 of gelatine, 1,50 g/m^2 of a nacreous pigment and 3.4 g/m^2 of a copolymer of ethylene and acrylic acid (7:1). On said layer was coated a layer comprising 4 g/m^2 of a copolymer of ethylene and acrylic acid (7:1).

Preparation and evaluation of the imaged material.

[0040] An identical image was in an identical way recorded and fixed on the two imaging elements with a color laser printer Phaser 550 from Tektronix, Oregon, USA. The adhesion of the image was qualitatively evaluated by scratching with a fingernail across the image. The image obtained with imaging element I (comparison element) was easily removed while the image obtained with imaging element II (element according to the invention) stayed intact even after vigourous scratching.

[0041] When said imaged elements are laminated to a security paper support, said paper support can be delaminated from the imaged element without damage to the support in the case of imaging element I while there is serious damage to the support in the case of imaging element II.

Claims

1. A method for preparing a security document comprising the step of printing with a laser printer on an imaging element comprising a support and a toner accepting layer, characterized in that said toner accepting layer is a layer comprising a copolymer of ethylene and acrylic acid.

2. A method for preparing a security document according to claim 1 wherein said toner accepting layer comprises at least 80 % by weight of said copolymer.

3. A method for preparing a security document according to claim 1 or 2 wherein said copolymer comprises between 10% and 50 % by weight of acrylic acid.

4. A method for preparing a security document according to claim 3 wherein said copolymer comprises between 13 % and 35 % by weight of acrylic acid.

5. A method for preparing a security document according to any of claims 1 to 4 wherein said copolymer has a weight average molecular weight between 10000 and 100000.

6. A method for preparing a security document according to any of claims 1 to 5 wherein said toner accepting layer has a pH between 3 and 10.

7. A method for preparing a security document according to any of claims 1 to 6 wherein said toner accepting layer is present in a weight between 0.5 g/m^2 and 30 g/m^2,

8. A method for preparing a security document according to any of claims 1 to 6 wherein said support

is a flexible transparent or opaque support.

9. A method for preparing a security document according to any of claims 1 to 8 wherein

   - the support of the imaging element is a flexible transparent support,
   - said imaging element is after imaging with a laser printer laminated to paper e.g. security paper.

Patentansprüche

1. Ein Verfahren zur Herstellung eines Sicherheitsdokuments, wobei ein einen Träger und eine tonerempfangende Schicht umfassendes bilderzeugendes Element in einem Laserdrucker bedruckt wird, dadurch gekennzeichnet, daß die tonerempfangende Schicht ein Ethylen-Acrylsäure-Copolymerisat enthält.

2. Verfahren zur Herstellung eines Sicherheitsdokuments nach Anspruch 1, dadurch gekennzeichnet, daß das Copolymerisat in einem Mindestverhältnis von 80 Gew.-% in der tonerempfangenden Schicht enthalten ist.

3. Verfahren zur Herstellung eines Sicherheitsdokuments nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das Copolymerisat zwischen 10 Gew.-% und 50 Gew.-% Acrylsäure enthält.

4. Verfahren zur Herstellung eines Sicherheitsdokuments nach Anspruch 3, dadurch gekennzeichnet, daß das Copolymerisat zwischen 13 Gew.-% und 35 Gew.-% Acrylsäure enthält.

5. Verfahren zur Herstellung eines Sicherheitsdokuments nach irgendwelchem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß das Gewichtsmittel des Molekulargewichts des Copolymerisats zwischen 10.000 und 100.000 liegt.

6. Verfahren zur Herstellung eines Sicherheitsdokuments nach irgendwelchem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß der pH der tonerempfangenden Schicht zwischen 3 und 10 liegt.

7. Verfahren zur Herstellung eines Sicherheitsdokuments nach irgendwelchem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß das Auftragverhältnis der tonerempfangenden Schicht zwischen 0,5 g/m^2 und 30 g/m^2 liegt.

8. Verfahren zur Herstellung eines Sicherheitsdokuments nach irgendwelchem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß der Träger ein biegsamer lichtdurchlässiger oder lichtundurchlässiger Träger ist.

9. Verfahren zur Herstellung eines Sicherheitsdokuments nach irgendwelchem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß

   - der Träger des bilderzeugenden Elements ein biegsamer lichtdurchlässiger Träger ist, und
   - das bilderzeugende Element nach der Bebilderung mit einem Laserdrucker auf Papier, z.B. Sicherheitspapier, laminiert wird.

Revendications

1. Un procédé pour préparer un document de sécurité, comprenant la phase consistant à imprimer avec une imprimante laser sur un élément formateur d'image comprenant un support et une couche réceptrice de toner, caractérisé en ce que la couche réceptrice de toner est une couche comprenant un copolymère d'éthylène et d'acide acrylique.

2. Un procédé pour préparer un document de sécurité selon la revendication 1, caractérisé en ce que ladite couche réceptrice de toner comprend au moins 80 % en poids dudit polymère.

3. Un procédé pour préparer un document de sécurité selon la revendication 1 ou 2, caractérisé en ce que ledit copolymère comprend entre 10 % et 50 % en poids d'acide acrylique.

4. Un procédé pour préparer un document de sécurité selon la revendication 3, caractérisé en ce que ledit copolymère comprend entre 13 % et 35 % en poids d'acide acrylique.

5. Un procédé pour préparer un document de sécurité selon l'une quelconque des revendications 1 à 4, caractérisé en ce que ledit copolymère a un poids moléculaire moyen en poids entre 10000 et 100.000.

6. Un procédé pour préparer un document de sécurité selon l'une quelconque des revendications 1 à 5, caractérisé en ce que la couche réceptrice de toner possède un pH entre 3 et 10.

7. Un procédé pour préparer un document de sécurité selon l'une quelconque des revendications 1 à 6, caractérisé en ce que la couche réceptrice de toner est présente dans un poids entre 0,5 g/m^2 et 30 g/m^2.

8. Un procédé pour préparer un document de sécurité selon l'une quelconque des revendications 1 à 6,

caractérisé en ce que le support est un support flexible transparent ou opaque.

9. Un procédé pour préparer un document de sécurité selon l'une quelconque des revendications 1 à 8, caractérisé en ce que

- le support de l'élément formateur d'image est un support flexible transparent.
- après qu'il a été imagé à l'aide d'une imprimante laser, l'élément formateur d'image est laminé sur un papier, p.ex. un papier de sécurité.